THE VITA PROJECT

Eradicating Childhood Blindness in Africa: The Promise of Orange-Flesh Sweetpotato

In sub-Saharan Africa, 3 million children under age five suffer blindness caused by lack of vitamin A. Vitamin A is produced by the body when it has sufficient quantities of a precursor known as beta-carotene. When it doesn't, the body can not produce sufficient vitamin A, and blindness can result. The World Health Organization (WHO) says that women with vitamin A deficiency face a significantly higher risk of death during pregnancy. And children are more likely to fall victim to other diseases if they don't have enough of this critical vitamin.

World development agencies have reacted to this serious health crisis by distributing vitamin A capsules and fortifying food. The results have been impressive—more than 12 million children received vitamin A supplements in 1997, and the number of children suffering from blindness related to vitamin A deficiency has dropped significantly.

In spite of these heroic efforts, many families do not have access to the supplements. They live in remote areas where the infrastructure for wholesale distribution doesn't exist, and are subject to further isolation from floods, landslides, and earthquakes, among other things. Transportation is sporadic, and it may take days to reach the nearest village.

CIP and its partner organizations have taken a different but complementary approach to fight vitamin A deficiency: the promotion of orange-flesh sweetpotato growth and consumption. Orange-flesh sweetpotatoes contain high amounts of beta-carotene, which is largely responsible for the orange color of the flesh. This approach complements the development agencies' supplement/fortification approach; is accessible to isolated, small rural communities; and—most important—can sustain itself over time once implemented.

Recent studies involving CIP, the International Center for Research on Women (ICRW), and the Kenya Agricultural Research Institute (KARI) have shown that—contrary to past beliefs—orange-flesh varieties *are* acceptable to African consumers, especially children. The age-old preference of Africans for white-flesh sweetpotatoes is now known to be more related to the texture (dry and starchy) than to the color. Orange-flesh sweetpotatoes with a drier, starchier texture have now been developed that are appealing to local consumers in vitamin A deficient areas and can be used for a variety of home- or community-produced local products, including cookies, cereals, rolls, and flour.

Building on this new knowledge, CIP, ICRW, KARI, Makerere University-Uganda, NARO-Uganda (National Agricultural Research Organization), and EARO (Ethiopian Agricultural Research Organization) are developing a regional project to take advantage of sweetpotato's nutritional value. This ambitious five-year project, called *VITA* (see next page), aims to:

- increase the availability and acceptability of orange-flesh sweetpotatoes in sub-Saharan Africa
- complement development agencies' supplementation/fortification efforts
- increase the capacity of national agriculture, health, and nutrition experts to incorporate sweetpotatoes in their recommendations
- stimulate and promote microenterprise development using products from orange-flesh sweetpotatoes
- teach household managers (women and children) the nutritional value and effects of consuming orange-flesh sweetpotatoes and encourage them to analyze their household's nutrition.

Above all, the main objective of this project is to ensure that, by the end of the five-year project period, no child with access to the simple and common sweetpotato will ever suffer blindness or disease caused by vitamin A deficiency.

See related articles online at:

www.cipotato.org/new/pressreleases/english/VITA.htm
www.cgiar.org/ifpri/themes/mp17/brbagsem/welch%2Da.htm
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www.cgiar.org/iita/publib/ph3/oct983.htm
www.icrw.org/omnibull.htm

The VITA Project

Framework

CIP will coordinate the VITA project as a technical partner, based on its extensive experience working with sweetpotato, and as a facilitator, to maximize the benefits of existing efforts to increase access to vitamin A. Children and mothers in Africa will be the major beneficiaries. The five major components of the project are described below.

Impact assessment. Researchers will conduct quantitative assessments of the potential for extending sweetpotato cultivation to remote areas and households; the number of potential beneficiary households; and the potential increase in the household nutrition index, based on sweetpotato use. This ex-ante impact assessment will determine the scope of VITA's potential contributions to increasing access to vitamin A, and will pinpoint optimum geographical areas for initial project implementation, based on expected impact. Ex-post evaluation conducted in the fifth and final year of the project will set the framework for large-scale extension of VITA technology.

Planning and constituency-building. Project planning and constituency building will include the identification of stakeholders, beneficiaries, and key policymakers. One objective will be to garner support for the use of vitamin-A-rich sweetpotatoes among national policymakers, nongovernmental organizations (NGOs), and development agencies working in agriculture, human health, and nutrition. A second but equally important objective will be to identify and link development professionals across country boundaries to form a regional network of VITA participants. This planning and constituency-building phase will include at least two regional meetings, where stakeholders will develop strategies, workplans, and funding proposals.

Adaptive research. A series of adaptive research and pilot extension activities will provide the ongoing flow of technology and information that is needed to expand the use of sweetpotato and boost access to vitamin A. The objective is to disseminate technology and data to VITA stakeholders to set the stage for large-scale distribution of new sweetpotato varieties upon project completion. All such activities will be conducted in cooperation with regional partner organizations, selected according to their specific expertise. Tasks will include conducting studies that further define the role of the new sweetpotato varieties in the family diet; developing and establishing microenterprises; testing on-farm, community, and household processing techniques, including the enrichment of local weaning foods; and implementing rural, community-based seed multiplication and distribution systems.

Training. VITA project sustainability will be ensured through training programs designed to build the local capacity to exploit new sweetpotato varieties to benefit those most in need. Training will cover technical elements, such as rapid propagation techniques, and health-related components that will target local medical professionals and focus on the new sweetpotato varieties and how to incorporate them into household diets to meet daily vitamin requirements.

Marketing and microenterprise development. To encourage acceptance and adoption of the new technology as well as the development and start-up of related microenterprises, the project will implement a marketing campaign and action plan targeting mothers and schoolchildren. The campaign will disseminate messages to help create demand for the new varieties and their food products and to encourage women to improve their families' health and nutrition.

First Steps

Establishing a regional contact network. Preliminary research has revealed many small projects and skilled researchers working to increase the acceptance and use of orange-flesh sweetpotato to combat disease and mortality related to vitamin A deficiency. The VITA project has contacted many of these practitioners, who specialize in areas such as medicine, health, nutrition, agriculture, social work, social science, food quality, and physiology at medical colleges, NGOs, universities, national research programs, hospitals, and local health organizations. Drawing on this human resource base, the project aims to establish a network to link these professionals and their expertise as a source for VITA partnerships and for specialized expertise within sub-Saharan Africa.

Conducting a regional workshop for planning and information exchange. VITA partners will gather at a workshop sometime in 2000 to exchange research results, describe progress, plan activities, determine priority areas, and construct country and regional action plans.

Facts about Vitamin A and Beta-Carotene

Beta-carotene versus vitamin A (retinol). Beta-carotene is produced in plants, whereas vitamin A is produced only in animals (including humans). Because the absorption of beta-carotene and its conversion to vitamin A in the body is controlled naturally , and because vitamin A itself does not exist in plants, there is little danger that over-ingestion of beta-carotene from a plant source such as sweetpotato could lead to vitamin A toxicity (as reported from over-ingestion of vitamin A supplements derived from animal sources, such as fish oils). If excessive amounts of beta-carotene are ingested (which is very unlikely), simply reducing the intake will correct the situation immediately with no lasting toxic effects.

Sweetpotato as a source of beta-carotene. Depending on the variety, 100 g of sweetpotato can provide enough beta-carotene to produce from 0 to 100% of the suggested daily vitamin A requirement, which is at least 350 micrograms (mg) per day for infants and young children. Because not all beta-carotene can be converted by the body, this translates to about 2400 mg of beta-carotene, an amount easily supplied by about 100 g of orange-flesh sweetpotato. With deeper-colored orange-flesh sweetpotatoes, the amount of fresh weight required to yield the daily requirement of beta-carotene is even less: some orange-flesh varieties tested by CIP have yielded 8000 mg of beta-carotene per 100 g of fresh weight.

Additional health benefits. If infants, young children, and adults are encouraged to eat more orange-flesh sweetpotato to protect themselves against blindness, they will also benefit from other health-enhancing features of this root, which provides adequate amounts of calories and vitamin B and vitamin C (absorbic acid) as well as helpful amounts of other micronutrients such as iron (the iron content in sweetpotato, although not high compared to most food crops, is still twice that in rice).

Sweetpotato versus "golden rice." Golden rice is rice that has been genetically transformed, using genes from daffodil (and a bacterium) so that beta-carotene is synthesized in the rice grains (beta-carotene is found naturally in rice leaves, but not in the grains). In contrast, sweetpotatoes biosynthesize beta-carotene naturally. Golden rice and orange-flesh sweetpotatoes are both valuable in terms of nutrition, because of their high level of beta-carotene. CIP believes that orange-flesh sweetpotatoes offer a quicker and more feasible solution to vitamin A deficiency in Africa than golden rice, because sweetpotato cultivation and consumption is a traditional part of the culture; rice is not. In addition, in Africa, sweetpotatoes are currently the cheapest year-round source of beta-carotene. Rice may be a more feasible solution to vitamin A deficiency in Asia, where growing and eating rice is traditional. Current research indicates that the convertible beta-carotene content of rice is about half that of sweetpotato.

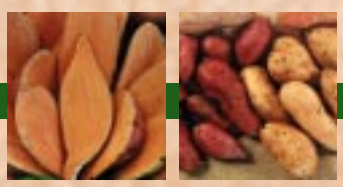
Complementarity with vitamin A supplementation programs. Vitamin A supplementation programs have been enormously successful on a global basis for the past 10 years. However, these programs are not always accessible to resource-poor farmers in remote areas of Africa, who are isolated by poor infrastructure and weather conditions that hinder transportation to and from program distribution outlets. For these remote communities, orange-flesh sweetpotatoes can be used to "supplement the supplement programs." Based on the idea that food-based approaches are the most sustainable and therefore the best option for building future food security worldwide, CIP intends to work with the health and nutrition sectors to maximize the potential of sweetpotato in boosting access to vitamin A.

High-beta-carotene sweetpotato varieties identified by CIP and its partners. More technical information on high-beta-carotene sweetpotatoes can be found in CIP's 1997–98 Program Report, *Impact on a Changing World* (www.cipotato.org/market/PgmRprts/pr97-98/34vitami.pdf). For more information on variety testing in Africa by the Kenya Agricultural Research Institute (KARI) and the International Center for Women (ICRW), see *The Effects of Women Farmers' Adoption of Orange-Fleshed Sweetpotatoes: Raising Vitamin A Intake in Kenya* (www.icrw.org/pdf/Kenyareport.pdf).

The International Potato Center (CIP) seeks to reduce poverty and achieve food security on a sustained basis in developing countries through scientific research and related activities on potato, sweetpotato, and other root and tuber crops, and on the improved management of natural resources in the Andes and other mountain areas.

CIP is part of the global agricultural research network known as the Consultative Group on International Agricultural Research (CGIAR).

CIP supports Future Harvest, an initiative that builds understanding about the wider social benefits of improved agriculture: peace, prosperity, environmental renewal, health, and the alleviation of human suffering.



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